**EXPERIMENT 3: RELATIONAL OPERATORS, LOOPS & PLOTS**

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| ***Note:*** (1) *Write your answers only in the* ***Space provided*** *against* ***each question***  (2) *Use* ***HELP*** *option of Matlab* |

**Run #01: Relational Operators & Logical Operators & Control Loops**

**Q1**. Write all **Relational** and **logical** Operators used in Matlab Programming

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| **Ans. :**  **Relational:**  Equality: ==  Greater than: >  Greater than or equal to: >=  Lesser than: <  Lesser than or equal to: <=  Inequality: ~  Array equality: *isequal*  Array equality (treating Nan values as equal): *isequaln*  **Logical:**  Logical operators with short-circuiting: short-circuit &&, ||  Logical AND: &  Logical OR: |  Logical NOT: ~  Logical XOR: xor  Determine if all elements of array is non zero or true: all  Logical 0: false  Find indices and values of non-zero elements: find  Determine if input is logical array: *islogical*  Convert numerical to logical values: *logical*  Logical 1: true |

Q2. Check which of the following ***Variables*** are valid or invalid ? What are the reasons?

(a) log2 (b) under\_dog (c) underdog (d) 5dog (e) log xyz

(f) abc-def (g) kota@55 (h) KINGmaker (i) Myclass21:42

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| **Ans. :**   1. Invalid 2. Valid 3. Valid 4. Invalid 5. Invalid 6. Invalid 7. Invalid 8. Valid 9. Invalid |

**Q3**. Write a matlab program to calculate the sum of the first ‘n’ terms of the series given below using for loop.

(Note : In the program, the **input** value 'n' should be taken from the user and **disp**lay the output with the text message 'Total sum= ')

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| ***Example : variable controlled loop***  for *variable = initial:inc:final*  *statements*  end  % inc = increment | ***Example : Relational controlled loop***  while *relation*  *statements*  end |

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| ***Example*** : An **if-elseif-else** structure in MATLAB  **if** expression1 % is true  % execute these commands  **elseif** expression2 % is true  % execute these commands  **else** % the default  % execute these commands  **End** |

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| **Ans. :**  n = input("enter a number");  summ = 0;  for i = 1:1:n;  summ = summ + (((-1)^i)\*i)/(2^i);  end  disp("Total value = ")  disp(summ);  **Output:**  enter a number5  Total value =  -0.2813 |

**Q4**. The following were the daily maximum temperatures (in F) for one month

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| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| T(F) | 58 | 73 | 73 | 53 | 50 | 48 | 56 | 73 | 73 | 66 | 69 | 63 | 74 | 82 | 84 |
| Day | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| T(F) | 91 | 93 | 89 | 91 | 80 | 59 | 69 | 56 | 64 | 63 | 66 | 64 | 74 | 63 | 69 |

Write a Matlab program using relational & logical operators and control loops to determine the following:

The number of days the temperature was

(i) above 75 (ii) between 60 and 80 (iii) between 50 and 60

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| **Ans. :**  T = [58, 73, 73, 53, 50, 48, 56, 73, 73, 66, 69, 63, 74, 82, 84, 91, 93, 89, 91, 80, 59, 69, 56, 64, 63, 66, 64, 74, 63, 79];    count1 = 0;  count2 = 0;  count3 = 0;    for day = 1:1:30  if T(day)>75  count1 = count1 + 1;  end  if T(day)>=60 && T(day)<=80  count2 = count2 + 1;  end  if T(day)>=50 && T(day)<=60  count3 = count3 + 1;  end  end    disp("Number of days >75: ")  disp(count1)  disp("Number of days >=60 and <=80: ")  disp(count2)  disp("Number of days >=50 and <=60: ")  disp(count3)  **Output:**  Number of days >75:  8  Number of days >=60 and <=80:  17  Number of days >=50 and <=60:  6 |

**Q5**. Write a MATLAB program to generate two random matrices, A and B of order m×n and p×q. Check whether the condition required for matrix multiplication is satisfied or not using relational operators.. If satisfied perform matrix multiplication else display matrix multiplication is not possible using **disp** keyword. Write a generic program which takes the order of the matrices during run from the user (use **input** keyword).

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| **Ans. :**  A = input("Enter the dimensions of first matrix ");  B = input("Enter the dimensions of the second matrix ");    if A(2)==B(1)  disp(randn(A(1),A(2))\*randn(B(1),B(2)))  else  disp("The matrix multplication is not possible");  end  **Output:**  Enter the dimensions of first matrix [ 2 3]  Enter the dimensions of the second matrix [ 2 3]  The matrix multplication is not possible  **Output2:**  Enter the dimensions of first matrix [2 4]  Enter the dimensions of the second matrix [4 3]  -0.4201 5.7183 0.6631  3.7980 -2.1843 4.5105 |

**Run #02: PLOTS**

**Q6. Keywords for plotting a figure**

Q12. Write comments (i.e. what is the purpose/what is its functionality) on the following keywords related to plotting a figure in MATLAB

1. plot ( );
2. stem ( );
3. Subplot ( );
4. x-label ( );
5. y-label ( );
6. title ( );
7. legend ( );
8. figure ( );
9. grid ( );
10. axis ( );
11. hold on;
12. hold off;

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| Answer :  Done in the previous experiment |

**Q7**. Write a matlab program using editor window to plot the function y = cos(t). Define a time

vector ‘t’ from 0 to 10 sec with an increments/steps of 0.1. Use x-label, y-label, title

commands to name the x-axis, y-axis and figure title.

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| Answer :  Done in the previous experiment |

**Q8.** .Write a MATLAB program to define a time vector ‘t’ from 0 to 2 with an increment/steps of . Using the generated ‘t’ values calculate the signals X1, X2 and X3 as given below

X1(t) = sin(t) ; X2(t) = sin(t - 0.25) ; X3(t) = sin(t - 0.5)

Plot X1(t), X2(t), X3(t) on same figure window (1) using hold on. Use different the plotting features like (a) linewidth (b) color and (c) different markers. (2) Without using ‘hold on’ now divide the figure window into subplots and plot X1, X2 and X3 in three separate subplots.

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| Answer :  Done in the previous experiment |

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**Link for uploading the completed observation is given separately for Tuesday and Thursday Batches**

**Thursday Batch Due on Sunday Feb 14th 5 PM**

**link to upload your observations** [**https://forms.gle/ikMbAtri9i3mYnTs7**](https://forms.gle/ikMbAtri9i3mYnTs7)

**Tuesday Batch Due on Sunday Feb 21st 5 PM**

**link to upload your observations** [**https://forms.gle/Kh5p2ruvo2AT6cm89**](https://forms.gle/Kh5p2ruvo2AT6cm89)